Caltrans photo by Scott Lorenzo

This new, self-propelled hoist has a reach of 83 feet and allows maintenance workers to safely inspect and repair bridges, or perform emergency tree trimming in all types of weather. It can be operated by a driver or remotely, and allows repairs in areas that crews have a hard time reaching.

Keeping Workers Out of Harm's Way

Advances in Equipment, Techniques Protect Roadside Maintenance Crews

Maintenance and construction workers spend more time alongside freeway traffic in one day than most of us will in a lifetime.

In 2017, one Caltrans worker died on the job — a toll collector whose booth was struck by a suspected drunken driver. There were 1,195 Caltrans employees injured on the job last year, including work zones, statistics show. On-the-job injuries have steadily decreased — a total of 22.3 percent — since 2013, and safety-first remains paramount with Caltrans.

Today, a new generation of highway maintenance equipment is giving Caltrans new tools that can save lives and reduce injuries on the state highway system — Caltrans' top two listed objectives in its 2015-2020 Strategic Management Plan.

Caltrans has been placing an emphasis on finding ways to keep work crews away from the flow of traffic, where they can still do their jobs at a safe distance or from the protection of their vehicles.

Landscape maintenance and certain road repairs offer the best opportunity for safety enhancements. Increasingly, workers no longer have to clamber out of their trucks and manually trim trees and bushes, maintain steep slopes, fill potholes only feet away from speeding traffic, or work in dimly lit conditions.

A new generation of highway maintenance equipment is giving Caltrans invaluable new tools that can save lives and reduce injuries on the state highway system.

Caltrans' Maintenance Division is already using or testing:

- Large multiuse trimmers, with extendable arms and an array of blades, that travel the highway paring back the thousands of oleander bushes and vegetation, cutting branches from trees, and trimming around guardrails. One of the large trimmers takes the place of chainsaw-carrying work crews. Caltrans is renting two of these "tool carriers," which can shave three miles of roadside shrubbery in a day. A barrier vehicle usually trav-

els behind for added safety.

- Remote-controlled mowers that can climb slopes of up to 60 degrees. These machines can navigate a cloverleaf interchange, or squeeze between sound walls, and have a track width that extends from 54 inches to 70 inches for better stability on steep hillsides.

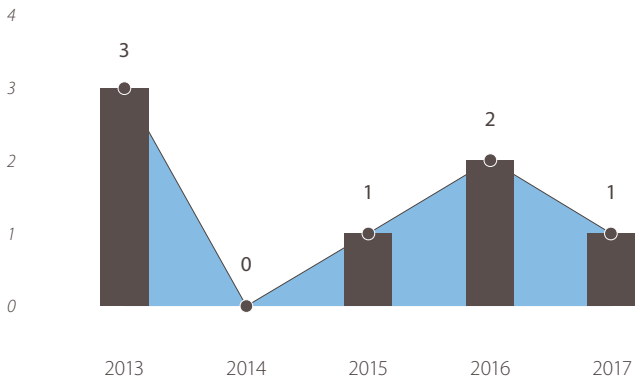
  The remote-controlled mowers are about the size of a large garden tractor, and are equipped to handle attachments such as a stump cutter and a loader bucket. They are designed for relatively confined spaces, and are highly maneuverable. Caltrans owns four of these mowers, and is testing a version known as a Green Climber. They can be operated from up to 1,000 feet away.
- A "pothole patcher" mounted on a truck chassis that mixes the patch material, cleans out the pothole to be repaired, and, with the help of a boom on the front, repairs the hole.

  In January, maintenance workers were trained on the motorized pothole patcher, which reduces the number of employees exposed to traffic and minimizes the number of full lane closures during these maintenance activities. Between January and September 2017, Caltrans received more than 6,400 service requests related to potholes.

Caltrans photo by Gilbert Montes-Chan

Remote-operated flagging devices such as this one on State Route 89 perform the same work as humans without exposing them to traffic.

Caltrans Work Zone Fatalities




Caltrans photo by Steven Hellon

Drums are larger and more visible than traffic cones and not knocked over as often, offering more protection at a construction job site.

District	Location Of Fatality	Fatality Type	Classification	2013	2015	2016	2017
2	Freeway/Highway	Death by Illness	Equipment Operator II	–	–	1	–
	Freeway/Highway	Struck By Object	Equipment Operator II	2	–	–	–
3	Freeway/Highway	Motor Vehicle Collision	Highway Maintenance Worker	1	–	–	–
4	Highway Structure/Bridge	Struck By Motor Vehicle	Toll Collector	–	–	–	1
7	Freeway/Highway	Struck By Motor Vehicle	Electrician I	–	–	1	–
HQ	Freeway/Highway	Motor Vehicle Collision	Transportation Engineer	–	1	–	–

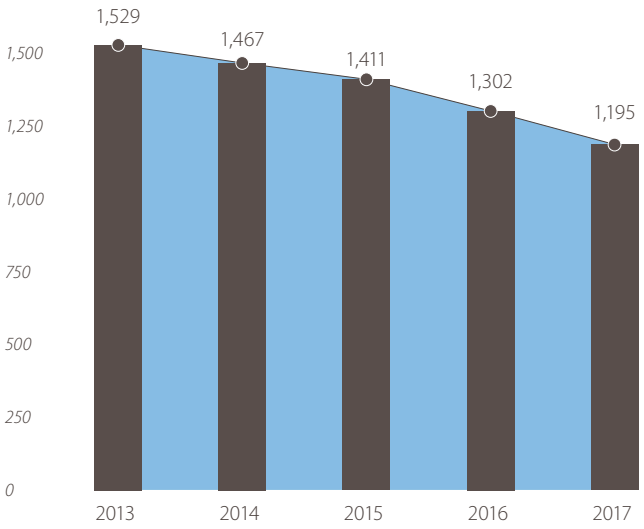
A driver is required in the cab of the patching vehicle, and two trucks trail behind for protection.

- Remote-operated flagging devices that, like their human counterparts, signal drivers to "slow" and "stop." The operators stand a safe distance away, and don't have to worry about inattentive drivers hitting them.

Caltrans has been testing two types of automated flagger: a Remotely Operated Safety Attendant (ROSA) with a "stop" and "slow" sign mounted on a pedestal with sounds and light alerts, and a trailer-mounted version with a remotely controlled mechanical arm that raises and lowers a gate to direct traffic through work zones. These automated flaggers enhance the visibility of the work zone.

- Increased visibility also is the motivation behind the testing of "halo lights" affixed to helmets that make workers more visible at night and in bad weather.

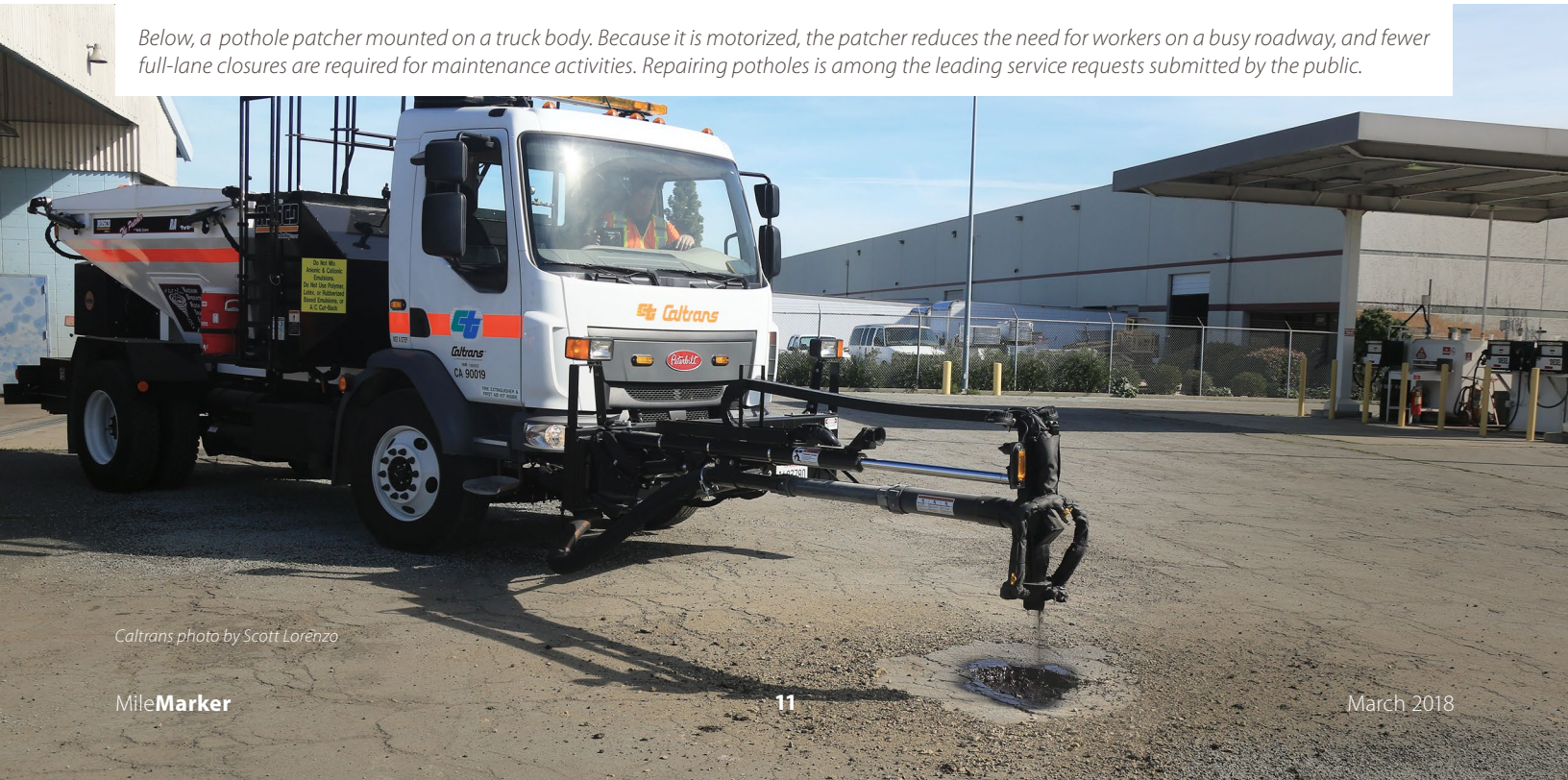
Caltrans Five-Year Injury Report



Caltrans photo by Scott Lorenzo

Halo lights make maintenance workers more visible at night.

Below, a pothole patcher mounted on a truck body. Because it is motorized, the patcher reduces the need for workers on a busy roadway, and fewer full-lane closures are required for maintenance activities. Repairing potholes is among the leading service requests submitted by the public.



Caltrans photo by Scott Lorenzo

These lights reflect off the workers' vests and come with a flashing strobe feature. Caltrans' workers who tested the lights overwhelmingly liked them.

- Maintenance workers were trained in January on a self-propelled personnel hoist with a reach of 83 feet that enables them to inspect and repair bridges, and perform emergency tree trimming in all weather conditions.

In another safety-related move, the Department recently repurposed two crew carrier vans that transport safety-related equipment and supplies such as vests, rain gear, gloves, goggles, hard hats, sunscreen, mosquito repellent and electrolyte drinks to workers in the field.

Two vans are in use in Districts 7 (Los Angeles and Ventura counties) and 11 (San Diego and Imperial counties), and every district will receive a safety van over the next two months. MM

Sources: *Theresa Drum, Safety and Training Liaison, Maintenance Division; Dale Greep, Statewide Equipment Manager, Division of Maintenance; Gregory Tollison, Assistant Statewide Equipment Manager, Division of Maintenance; Shanna Everts, Office Chief, Office of Health and Safety, Division of Safety & Management Services; Erin Gallup von Tersch, public information officer.*

Caltrans Builds In Safety for Construction Projects

Caltrans has taken many steps and developed procedures to make construction work zones safer for field staff, contractors and the public.

Those measures include:

- **Vehicle speed feedback signs** — Trailers can be stationed at a work zone to alert motorists of their speed.
- **Temporary rumble strips** — Portable raised strips are placed transversely across a road to reduce speeds.
- **Automated Work Zone Information Systems (AWIS)** — Changeable Message Signs tied to sensors in work zones. Messages are updated to alert motorists of changing traffic conditions. AWIS has been used in District 3 (Sacramento/Marysville area) and District 7 (Los Angeles/Ventura counties) and District 11 (San Diego and Imperial counties) for longer-term projects.
- **Training** — Classes keep employees updated on new policies and procedures. For example, field staff recently was provided an online training course on silica exposure. Silica is dust generated by grinding and drilling that can occur on job sites. These small dust particles can be a health hazard under certain conditions.

Other measures:

- Improved reflective sheeting will be used as backing for all temporary construction area signs.
- For longer duration closures, traffic drums can be used instead of cones. The drums are larger and more visible, and are not knocked over as often, offering workers more protection from passing traffic.
- Using temporary striping in work zones instead of flexible road tabs (temporary markers). The striping is more visible. Caltrans specifications still allow for tabs to be used on short duration work.

Vehicle Speed Feedback Signs such as this one on I-5 are stationed at work zones to remind motorists how fast they are driving.

Source: *Deborah Yost, Acting Office Chief of Safety, Insurance & Special Projects, Division of Construction*